



CONTACT DETAILS

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University of Venda

Creating Future Leaders



**FACULTY OF
SCIENCE, ENGINEERING
AND AGRICULTURE**

Department of Physics

INTRODUCTION TO PHYSICS

Pursuing physics is important because it deepens our understanding of the universe and drives innovation that shapes modern society. Physics provides the foundational knowledge behind countless technologies—from electricity and magnetism that power our homes and devices to the principles of motion that enable transportation and space exploration.

It also nurtures critical thinking and problem-solving skills, which are valuable in a wide range of careers beyond science, such as engineering, finance, and even medicine. Moreover, physics helps us tackle some of the most pressing global challenges, like developing sustainable energy solutions, understanding climate change, and improving medical imaging and treatment techniques. By exploring the fundamental laws of nature, physics not only answers profound questions about how the universe works but also fuels the technological advancements that improve our quality of life and drive economic growth.

WHAT IS PHYSICS?

Physics is the branch of science that studies the fundamental principles governing the behaviour of the universe. It seeks to understand the nature of matter, energy, space, and time by observing how objects move and interact. From the tiniest particles that make up atoms to the vast movements of galaxies, physics provides a framework for explaining how and why things happen. It relies heavily on mathematics to describe physical phenomena and uses experiments to test theories and models. At its core, physics is divided into several key areas, such as mechanics, thermodynamics, electromagnetism, and quantum physics. Each of these fields explores different aspects of the natural world, helping scientists develop technologies and solve real-world problems. For example, understanding the laws of motion and gravity has allowed humans to build aeroplanes and send rockets into space. Through continuous discovery and innovation, physics plays a crucial role in advancing our knowledge and shaping modern life.



ENTRY REQUIREMENTS

Applicants wishing to pursue a B.Sc. degree in physics must have obtained a minimum admission requirement in a National Senior Certificate (NSC) as certified by the Council for General and Further Education and Training (UMALUSI) with an achievement rating of 4 (adequate achievement, 50-59%) or better in each of the following four recognized 20-credit NSC subjects: English, Mathematics, Physical Sciences and Life Sciences.

UNDERGRADUATE PROGRAMME AND MODULES

To major in physics, a student must register for the following modules:

FIRST-YEAR CLASS:
PHY 1121, PHY 1122, PHY 1223 and PHY 1224

SECOND-YEAR CLASS:
PHY2121, PHY 2122, PHY 2223 and PHY 2224

THIRD-YEAR CLASS:
PHY 3121, PHY 3122, PHY 3223 and PHY 3224

POSTGRADUATE STUDIES

After obtaining an undergraduate degree with physics as a major, students with physics 3rd-year modules with an average of 60% or more can pursue a BSc honours degree in physics, which is done over one year.



MSc AND PHD IN PHYSICS

The Department of Physics offers MSc and PhD degrees across all four major physics sections: Renewable Energy, Solid State Physics, Electrodynamics, Nuclear Physics And Quantum Mechanics.

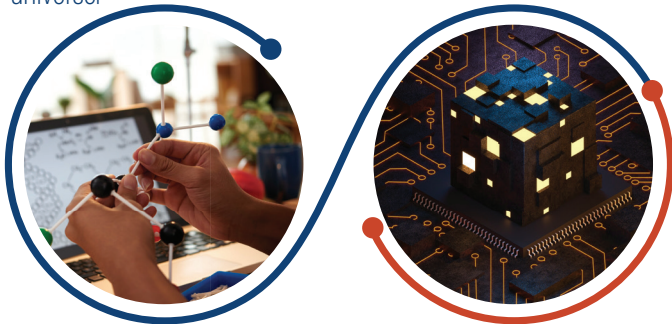
Research in renewable energy involves developing and optimizing sustainable technologies like solar, wind, hydro, and bioenergy. MSc studies focus on applied research and system design to tackle specific challenges, while PhD research emphasizes theoretical modelling and original contributions to the field. Both levels require interdisciplinary collaboration in engineering, environmental science, economics, and policy to promote low-carbon energy systems.

Research in solid-state physics aims to understand the physical properties of solid materials at atomic and electronic levels. MSc studies typically focus on materials or phenomena like conductivity and magnetism, applying principles to practical issues. PhD research delves into novel materials and quantum effects, contributing new theories and techniques. This field is crucial for advancements in semiconductors, superconductors, and nanotechnology, integrating physics with materials science and engineering.

Research in Electrodynamics studies electric and magnetic fields, their interactions with matter, and electromagnetic wave propagation. At the MSc level, it focuses on applying classical concepts to practical issues in areas like antennas and optical systems. PhD research explores advanced topics such as relativistic electrodynamics and quantum electrodynamics, along with new theoretical frameworks and computational models. This field is essential for technologies like wireless communication and photonics and is crucial in both applied and theoretical physics.

Research in Nuclear Physics examines atomic nuclei, their structure, reactions, and the fundamental forces at play. MSc research often focuses on experimental or theoretical studies of nuclear decay, radiation detection, or reactions, with applications in medicine, energy, and security. PhD research delves into advanced topics like nuclear astrophysics, heavy-ion collisions, and nuclear models. This field enhances our understanding of matter and supports advancements in nuclear energy, particle physics, and high-tech industries.

Research in Quantum Mechanics focuses on the principles that govern matter and energy at atomic and subatomic levels. MSc research applies established quantum theories to systems like atoms and molecules, with applications in spectroscopy, quantum computing, and nanotechnology. PhD research explores advanced topics such as quantum entanglement and foundational issues like measurement, often leading to original theories or experimental methods. This work supports many innovative technologies and expands our understanding of the physical universe.



ENTRY REQUIREMENTS

Qualified physicists find themselves working at universities as Physics lecturers and at schools as Physics Teachers.

Also, they find jobs at different research companies as Research Scientists/physicists, Data Scientists or Analysts, Design and development engineers, Medical Physicists, Quantum Computing Researchers, Software Developers/simulations, Specialists, Accelerator Physicists, Consultants or Technical Advisors.

